



**Fermilab**

$\bar{p}$  Note #412

DO LIMITS FROM THE ACCELERATOR

D. Finley

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To: P. Koehler  
From: D. Finley  
Subj: DO Limits from the Accelerator

The DO low beta beam design is not final. The present best estimate of the DO low beta design is based on a SYNCH run by D. Johnson of 11 OCT 83. This run has low beta at both BO and DO. The BO and DO low beta quads are mechanically identical in this design, but their currents are different. Based on this mechanical equivalence of BO and DO, one can answer certain questions about beam locations.

All of the following which is appropriate is to appear as soon as possible on prints under the control of M. May. All numbers are considered preliminary until checked by the appropriate people.

#### DO Overpass

The Main Ring beam is to be located 81.46 inches above the Tevatron beam and 12.98 inches radially inward from the Tevatron beam at DO. This is called the WDB1 version and is shown on page 3.

#### Main Ring Beam Pipe Diameter

The Main Ring beam pipe in a long straight section is six inches in diameter. This size is chosen in order to avoid hitting this pipe with beam. A smaller diameter pipe has the possibility of being hit by errant Main Ring beam and becoming unnecessarily radioactive. I think it would be foolish to cut down on this dimension since this pipe passes through the calorimeter.

#### Longitudinal Clearances

Page 4 shows the longitudinal clearances recommended for DO. The distance between the low beta quads represents the value for BO as shown in Figure 9-1 of the September 1984 Tevatron I Design Report. It is taken between the ends of the effective magnetic fields as given by SYNCH. The "flange to flange" distance shown on page 4 is not the clearance available to the detector; two items immediately come to

mind which affect this distance.

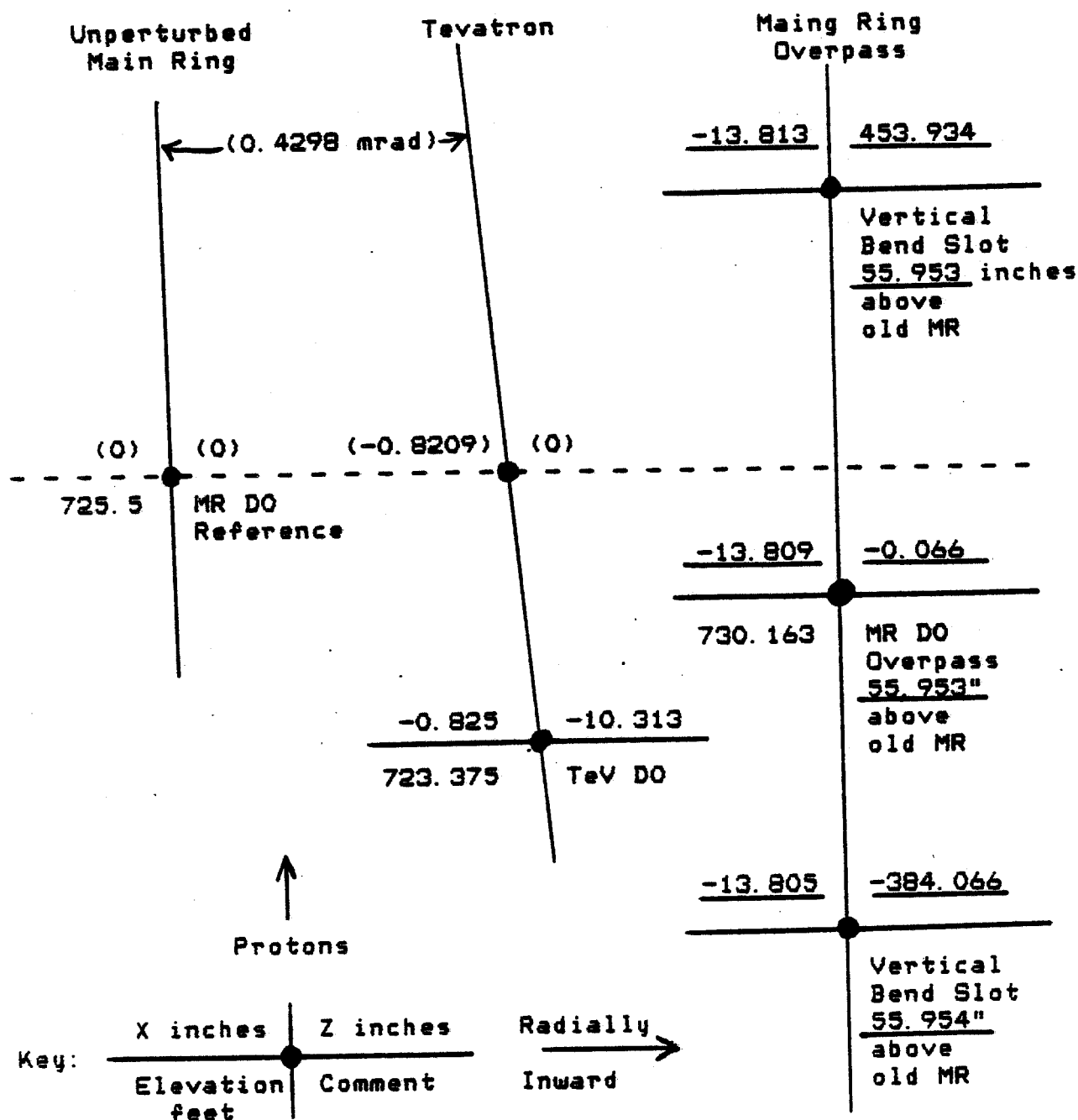
The first item - tolerance and bellows - decreases this distance. I allow several inches clearance on each side for these, and I choose 6.95 inches on each side. This results in a required clearance of 45 feet (exactly) for items which move (with the detector) transverse to the beam lines at DO.

The second item which affects the longitudinal geometry along the Tevatron is beam instrumentation. At BO, K. Koepke (no longer a private communication) has made a deal with the CDF people to allow a pair of beam position monitors (BPM's) to be installed in the Tevatron beam line on each side of BO. Today, these BPM's occupy an additional 29 inches along the beam line both at the A49 and B11 side, and the agreement is that they remain inside a cylinder of 8 inch diameter. CDF then builds up (permanently) around this cylinder. The exact length of the cylinder is still negotiable, but the diameter is not.

The need for beam instrumentation at DO is no less critical, but the detailed geometry may have to be different. This is primarily a conflict with the PC modules of the detector. These modules are to cover the smallest angles (from 1 to 5 degrees), and are calorimeters composed of uranium/argon, according to M. Marx. One must come up with a reasonable design to accomodate both the PC modules and the need for beam instrumentation. H. Jostlein has agreed to handle this, but the final approval is still ours.

#### Distribution:

H. Edwards  
H. Jostlein  
M. May  
S. Ohnuma  
C. Moore  
S. Pruss  
T. Toohig

05-Oct-84  
D. FinleyDO Overpass-PRELIMINARY

1. Numbers in parentheses are from TM-1032, "The Revised Great Doubler Shift" (March 17, 1981) by T.L. Collins and S. Ohnuma. This TM has the Tevatron 25.5 inches below the Main Ring.

2. Underlined numbers are from C. Moore WDB1 overpass 28 Sep 84, using S. Ohnuma's program.

3. Main Ring elevation is from T. Toohig.

4. TeV BO Z = -10.313 as shown in Print 2214-MD-187011 (3-28-83) originated by K. Koepke. TeV DO is taken to be the same.

5. MR DO Reference in UPC-163 "Geometry of the Superconducting Ring" (3 Sep 82) by S. Ohnuma is given in DUSAF

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DO Low Beta Longitudinal Clearance-PRELIMINARY

All values in inches.

